

ENE2000-P and ENE2000-S
E1 Network Extenders Installation Instructions

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Product Documentation

This document describes units manufactured after 14 March 2005. See the prior version of this document for information about units manufactured on or before that date.

Complete documentation for Paradyne products is available at www.paradyne.com. Select *Support* → *Technical Manuals*.

To order a paper copy of a Paradyne document, or to speak with a sales representative, please call 1-727-530-2000.

Warranty, Sales, Service, and Training Information

Contact your local sales representative, service representative, or distributor directly for any help needed. For additional information concerning warranty, sales, service, repair, installation, documentation, training, distributor locations, or Paradyne worldwide office locations, use one of the following methods:

- **Internet:** Visit the Paradyne World Wide Web site at www.paradyne.com. (Be sure to register your warranty at www.paradyne.com/warranty.)
- **Telephone:** Call our automated system to receive current information by fax or to speak with a company representative.
 - Within the U.S.A., call 1-800-795-8004
 - Outside the U.S.A., call 1-727-530-2340

Package Contents

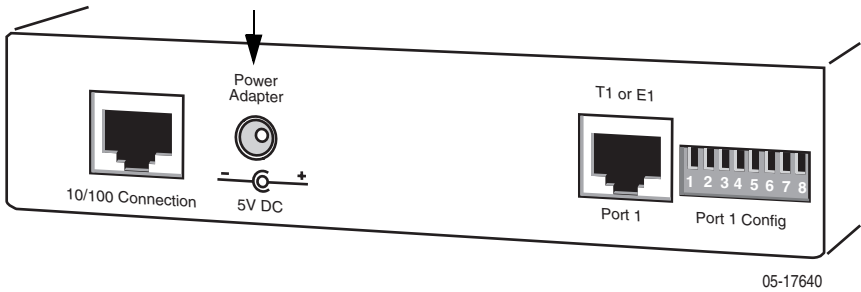
Unpack and Inspect the Equipment. The following components should be included:

- 1 ENE2000
- 1 Power supply

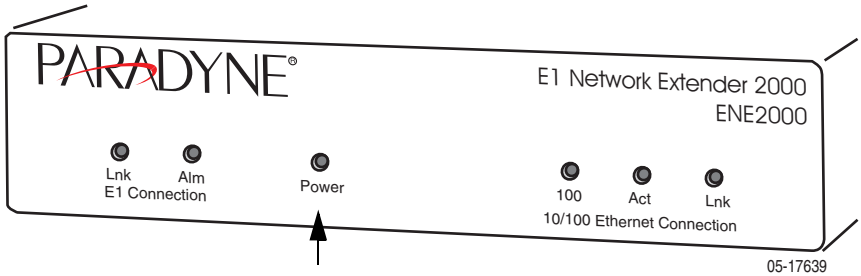
If there is any visible damage, do not attempt to connect the device. Contact your sales or service provider.

Powering Up the ENE2000

Plug the power supply into the power adapter port on the back of the ENE2000 and connect it to your power source.



Verify that the Power LED on the front of the ENE2000 is illuminated.



NOTE: Upon start up, the Ethernet link will remain disabled (as indicated by no illumination of the Ethernet 100, Act and Lnk LEDs) until the E1 connection has been established.

Configuring the E1 Port

Configuration Switches are numbered from left to right, 1–8.

Table 1. Configuration Switch Settings

	ENE2000-P Provider Configuration Switches	ENE2000-S Subscriber Configuration Switches
Switch	Port 1	Port 1
1	Speed	Not used. The ENE2000-S determines speed via communication with its partner E1 provider unit.
2		
3	Frame Type	Frame Type
4	Line Code	Line Code
5	Not used	Not used
6	Not used	Not used
7	Timing	Not used. The ENE2000-S determines timing via communication with its partner E1 provider unit
8	Not used	Not used

Speed

On the ENE2000-P (only), switches 1 and 2 control the port speed.

The E1 line has 31 channels continuously running at 64 kbps for a collective bandwidth of 1,984 kbps. The timeslot configuration determines how many of the channels will actually receive data. Ports configured to operate as fractional E1 lines require contiguous timeslots as indicated in the table below.

Port 1 configuration switches 1 and 2 on the ENE2000-P work together to provide four timeslot/bandwidth options for the Port 1 E1 link.

The ENE2000-S determines timeslot and bandwidth configuration for the E1 link via communication with its partner E1 provider unit.

Table 2. Speed Settings Using Switches 1 and 2

Switch 1	Switch 2	Timeslots	Bandwidth (kbps)
Down	Down	1–31	1,984
Up	Down	1–24	1,536
Down	Up	1–16	1,024
Up	Up	1–8	512

Frame Type

Switch 3 sets the Frame Type for the E1 port on both the ENE2000-P and the ENE2000-S.

Frame type is the E1 data encapsulation method. A frame consists of 248 bits (8-bit samples of each of the 31 E1 data channels plus a synchronization bit) transmitted at a rate of 8,000 frames per second (1,984 kbps) across the E1 line. The ENE2000 can be configured to use Cyclic Redundancy Check (CRC) to detect line errors and scrutinize data integrity across the E1 line by appending a hexadecimal checksum (calculated from the previous E1 frame contents) to the end of each E1 frame. The remote modem then makes a similar calculation upon receipt of each E1 frame and compares it to the checksum of the ensuing E1 frame.

Table 3. Frame Type Settings Using Switch 3

Switch 3	Frame Type
Down	Cyclic Redundancy Check
Up	No Cyclic Redundancy Check

Line Code

Switch 4 sets the Line Code for the E1 port on both the ENE2000-P and the ENE2000-S.

Line code is the E1 mode of transmission. The two line code options outlined below fall within the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) G.703 Standards for Transmission Facilities.

- **High Density Binary 3** – High Density Binary 3 (HDB3) is used to accommodate the minimum ones density requirement in the European public network. HDB3 line encoding helps prevent loss of synchronization between the ENE2000 and remote E1 equipment by using bipolar violations to guarantee the presence of pulses in the E1 line.
- **Alternate Mark Inversion** – Alternate Mark Inversion (AMI) simply alternates positive and negative pulses. Although AMI links typically encounter long strings of zeros which can potentially cause loss of synchronization between units, the ENE2000 meets the European minimum ones density requirement internally such that, even with AMI, loss of synchronization is prevented between the ENE2000 and remote E1 equipment (just as it is with HDB3).

Table 4. Line Code Settings Using Switch 4

Switch 4	Line Code
Down	High Density Binary 3
Up	Alternate Mark Inversion

Timing

Switch 7 sets the timing for the ENE2000-P (only). The ENE2000-S determines timing for its E1 link via communication with its partner E1 provider unit.

Timing refers to the clock source for E1 transmission links.

- **Local Clock Source** – Local clock source refers to timing derived from an oscillator onboard the ENE2000-P.
- **Loop Clock Source** – Loop clock source refers to timing derived from an intermediate device.

Table 5. Setting Timing Source Using Switch 7

Switch 7	Clock Source
Down	Local
Up	Loop

Connecting the E1 Line

To connect the E1 line:

► Procedure

1. Plug the E1 cable into the E1 RJ45 port on the back of the ENE2000.
2. Verify the connection: the E1 link LED on the front of the ENE2000 will pulse green to indicate the connection is established and operational.

Connecting the Ethernet Line

The 10/100BaseT Ethernet Port auto-negotiates speed and duplex mode in accordance with the remote equipment to which it is connected; Ethernet speed and duplex mode configurations cannot be configured on the ENE2000. For the best connection results, the remote device (PC, hub, or switch) should be set to auto-negotiate speed and duplex mode. If the remote device cannot be configured to auto-negotiate, speed may be set at either 10 Mbps or 100 Mbps but duplex mode must be set to Half Duplex. A 10/100BaseT Ethernet connection will not operate properly if the remote device is set to Full Duplex.

► Procedure

1. Plug the Ethernet cable into the 10/100 Ethernet Port on the back of the ENE2000.
2. Verify the connection: solid green illumination of the 10/100 Ethernet Connection Lnk (Link) LED on the front of the ENE2000 indicates a connection has been established. If the Ethernet Lnk LED is illuminated but not the Ethernet 100 LED, then a 10 Mbps connection has been established. If the Ethernet Lnk and 100 LEDs are both illuminated, then a 100 Mbps connection has been established.

For most applications, the ENE2000 connects to a PC using a straight-through Ethernet cable and to a hub or a switch using a crossover Ethernet cable. For any other connection combinations you must verify the pinout of the Ethernet device to which you are connecting the ENE2000 in order to determine which type of cable is required.

LED Indicators

This document describes units manufactured after 14 March 2005. See the prior version of this document for information about units manufactured on or before that date.

Whenever the E1 connection has lost link or has presented an E1 Alarm, the Ethernet link will automatically be disabled (as indicated by no illumination of the Ethernet 100, Act and Lnk LEDs). Upon reestablishment of the E1 connection, the Ethernet link will be reinstated and the Ethernet LEDs will reflect current Ethernet Status.

Table 6. LEDs (1 of 2)

LED	State	Indication	Additional Information
E1 Connection Lnk	Flashing* Green	E1 connection is established and active	Traffic is flowing.
	Solid Green	Problematic E1 connection	A connection exists but there is indication of a problem with the E1 line.
	No Illumination	Loss of Synchronization (LOS) – The incoming connection to the unit has been lost; no data is being received.	If the outgoing connection from the unit has also been lost then the unit's partner ENE2000 will have LOS as well.
E1 Connection Alm	No Illumination	E1 is operational	An established E1 link has no alarm indications and is operational unless the E1 Lnk LED remains unlit as well, in which case the ENE2000 has LOS.
	Solid Amber	Remote Alarm Indication (RAI) – The outgoing connection from the unit has been lost; no data is being transmitted.	The unit's partner ENE2000 has lost its incoming connection and has LOS.
	Pulsing* Amber	Alarm Indication Signal (AIS) – An indirect connection has been lost; the unit may no longer be receiving data from its partner ENE2000.	The unit's partner ENE2000 has lost a connection with an intermediate device and has LOS or RAI.
Power	Solid Green	ENE2000 is operational	If the Power LED is not illuminated, it is unlikely that the ENE2000 is receiving power and therefore none of the LEDs will be illuminated.

Table 6. LEDs (2 of 2)

LED	State	Indication	Additional Information
10/100 Ethernet Connection 100	Solid Green	100 Mbps Ethernet connection is established	If the Ethernet 100 LED is illuminated, the Ethernet Lnk LED will also be illuminated.
	No Illumination	No 100 Mbps Ethernet connection	If the Ethernet 100 LED remains unlit but the Ethernet Lnk LED is illuminated then a connection has been established at 10 Mbps rather than 100 Mbps.
10/100 Ethernet Connection Act	Pulsing* Amber	Standard operation	Traffic is flowing without any problems.
	Solid Amber	Heavy traffic	
	No Illumination	No activity	Either there is no Ethernet link or a link exists but there is no activity.
10/100 Ethernet Connection Lnk	Solid Green	Ethernet connection is established	If the Ethernet Lnk LED is illuminated but not the Ethernet 100 LED then a 10 Mbps connection has been established. If the Ethernet 100 LED is also illuminated, then a 100 Mbps connection has been established.
	No Illumination	No Ethernet connection	The Ethernet 100 and Act LEDs will remain unlit by default.

* A pulsing LED blinks steadily at a rate of once per second. A flashing LED blinks at a more rapid, less constant rate.

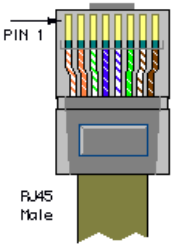
RJ45 Pin Assignments

E1 RJ45 Pin Assignments

If you are using a shielded E1 cable for your network connection, it must be grounded through pins 3, 6, 7 and 8.

Table 7. E1 RJ45 Pin Assignments

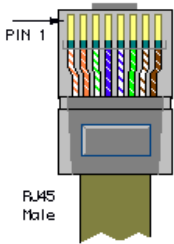
Pin	Function
Pin 1	Rx Ring
Pin 2	Rx Tip
Pin 3	not used
Pin 4	Tx Ring
Pin 5	Tx Tip
Pin 6	not used
Pin 7	not used
Pin 8	not used



Ethernet RJ45 Pin Assignments

Table 8. Ethernet RJ45 Pin Assignments

Pin	Function
Pin 1	Rx+
Pin 2	Rx-
Pin 3	Tx+
Pin 4	not used
Pin 5	not used
Pin 6	Tx-
Pin 7	not used
Pin 8	not used



EMI Notices

United States – EMI Notice:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Paradyne Corporation.

If the equipment includes a ferrite choke or chokes, they must be installed per the installation instructions.

Canada – EMI Notice:

This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in the manual.
2. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.
3. Do not attempt to service this product yourself, as opening or removing covers may expose you to hazardous voltage or to other risks. Refer all servicing to qualified service personnel.
4. General purpose cables are used with this product for connection to the network. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer. Use a UL Listed, CSA certified, minimum No. 26 AWG line cord for connection to the Digital Subscriber Line (DSL) network.
5. When installed, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.
6. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.
7. Input power to this product must be provided by one of the following: (1) a UL Listed/CSA certified power source with a Class 2 or Limited Power Source (LPS) output for use in North America, or (2) a certified Class II power source, with a Safety Extra Low Voltage (SELV) output having a maximum of 240 VA available, for use in the country of installation.
8. In addition, since the equipment is to be used with telecommunications circuits, take the following precautions:
 - Never install telephone wiring during a lightning storm.
 - Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
 - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
 - Use caution when installing or modifying telephone lines.
 - Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
 - Do not use the telephone to report a gas leak in the vicinity of the leak.



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